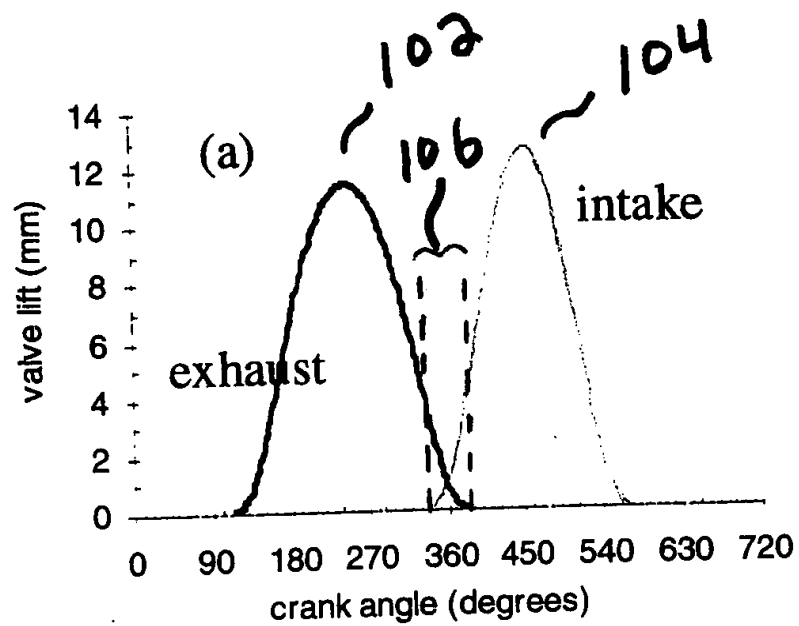


FIG. 1. Prior Art



The diagram illustrates a VVT system (200) with a mechanical camshaft (212) and a VVA control unit (216). The VVA control unit is connected to an ECU (214) and a TC control unit (230). The TC control unit is connected to a water pump (220) via a line (218). The water pump is connected to a manifold (204) via a line (222). The manifold is connected to a series of six valves (202) via a line (210). The valves are connected to a common outlet (228) via a line (224). An intercooler (226) is connected to the common outlet (228) via a line (222).

Fig. 2

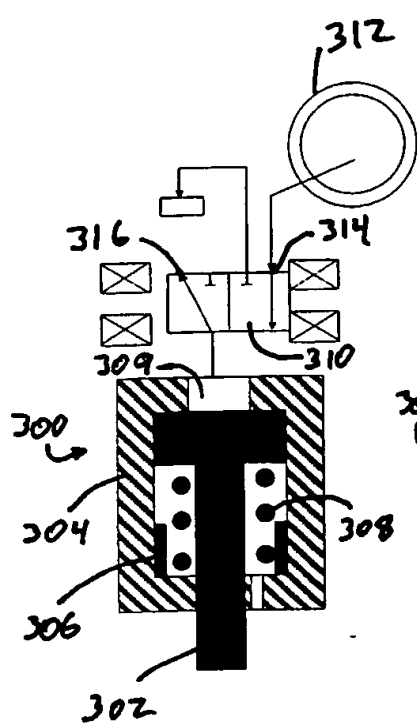


Fig. 3

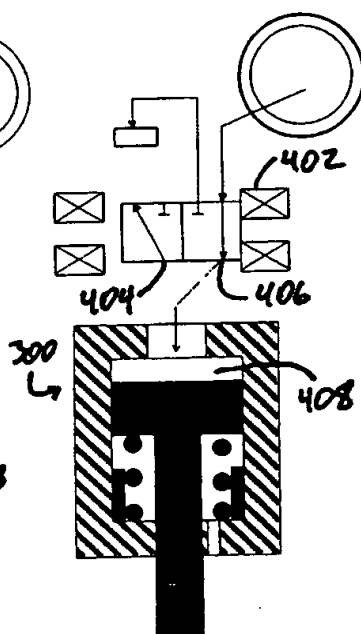


Fig. 4

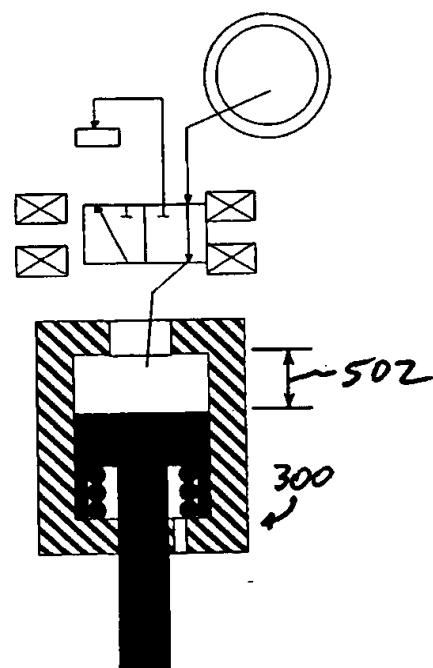


Fig. 5

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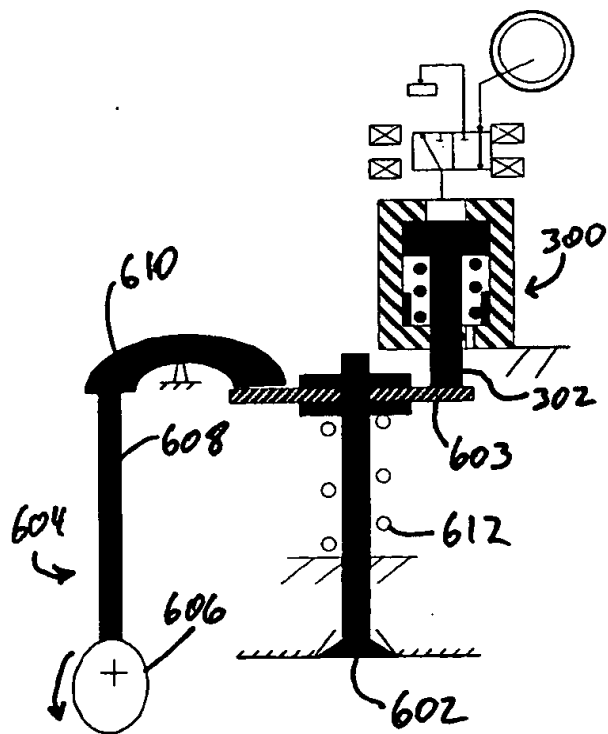


Fig. 6

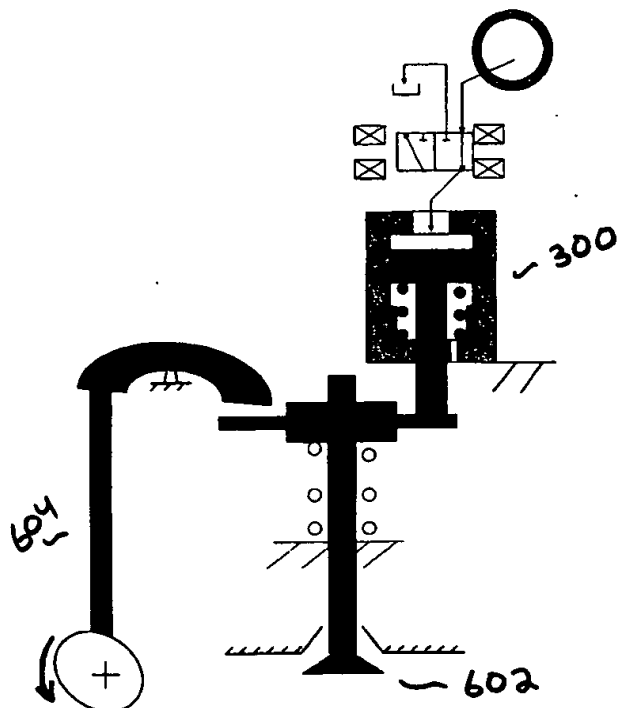


Fig. 7

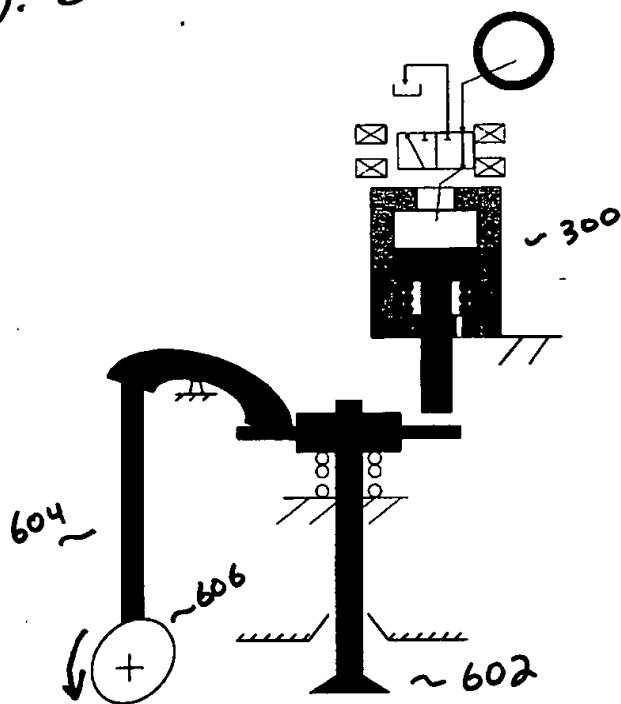


Fig. 8

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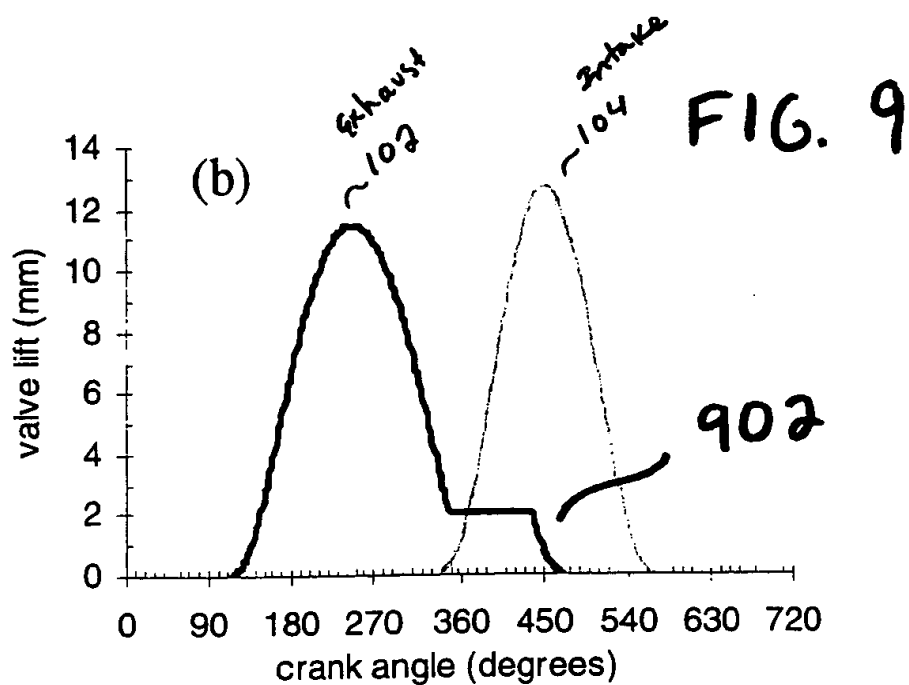


FIG. 10

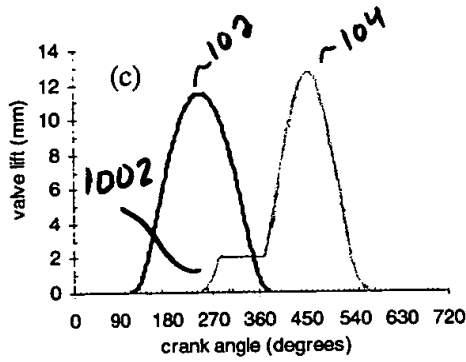


FIG. 11

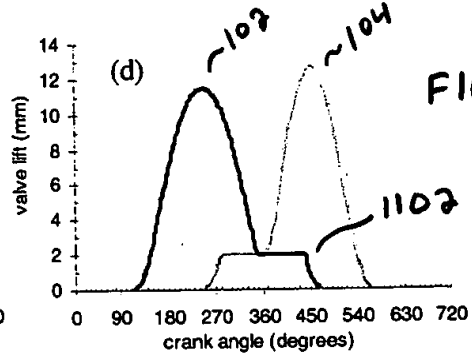


FIG. 12

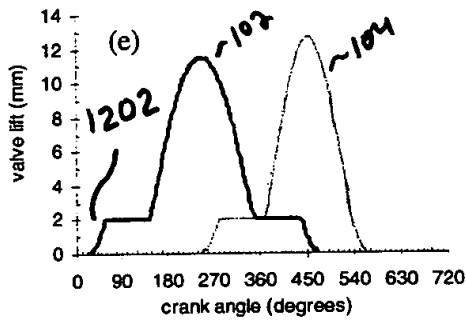


FIG. 13

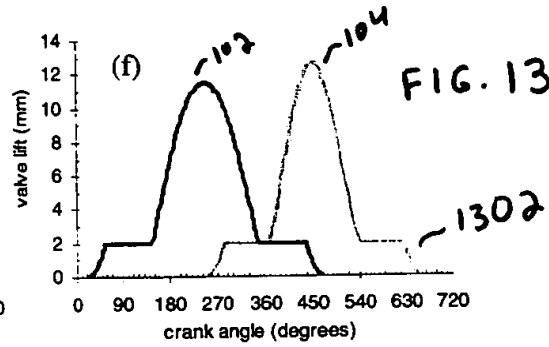


FIG. 14

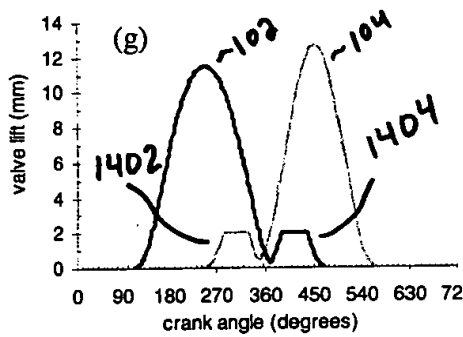
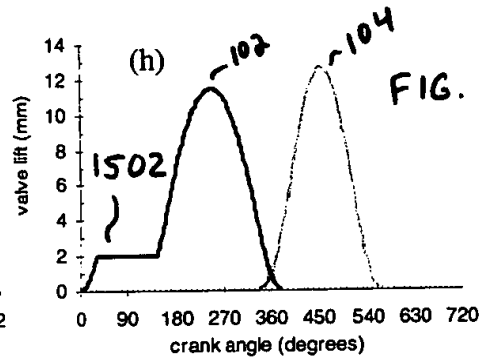


FIG. 15



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The graph plots the internal EGR fraction (y-axis) against the condition 'EVC retarded and/or NO advanced' (x-axis). Two data series are shown: 'internal EGR (VNT vane full open)' represented by squares and 'internal EGR (VNT vane almost full closed)' represented by triangles. Both series show an increasing trend, with the 'almost full closed' condition consistently resulting in a higher internal EGR fraction.

Condition	internal EGR (VNT vane full open)	internal EGR (VNT vane almost full closed)
1	~0.05	~0.08
2	~0.05	~0.09
3	~0.06	~0.12
4	~0.07	~0.15
5	~0.10	~0.22
6	~0.13	~0.28
7	~0.16	~0.35
8	~0.18	~0.42

The graph shows the relationship between the air-to-fuel ratio and the timing of the valves (EVC retarded and/or IVO advanced). Two data series are plotted:

- air-to-fuel ratio (VNT vane full open):** Represented by a dashed line with triangle markers. This series shows a significant decrease in the air-to-fuel ratio as the timing is retarded/advanced.
- air-to-fuel ratio (VNT vane almost full closed):** Represented by a dashed line with square markers. This series shows a much smaller decrease in the air-to-fuel ratio compared to the full open condition.

Both series start at a high air-to-fuel ratio (approximately 14.5) and decrease as the timing is retarded/advanced. The full open condition starts at a higher ratio (approximately 14.5) and decreases more sharply than the almost full closed condition (starting at approximately 13.5).

Fig. 17

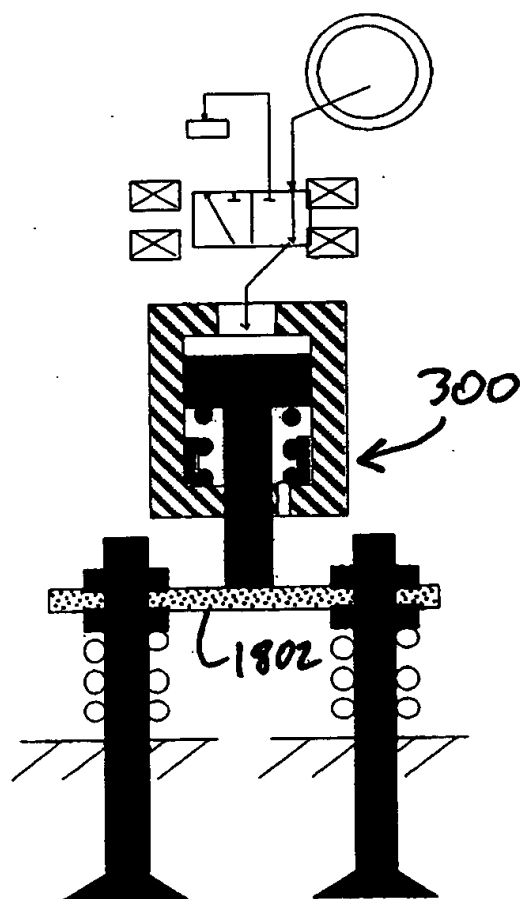


Fig. 18

20250909 10067333 030402

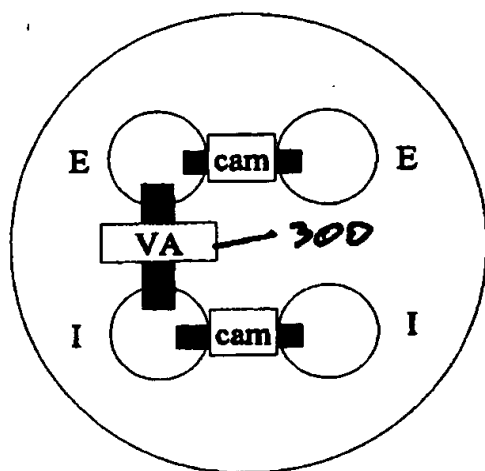


Fig. 19

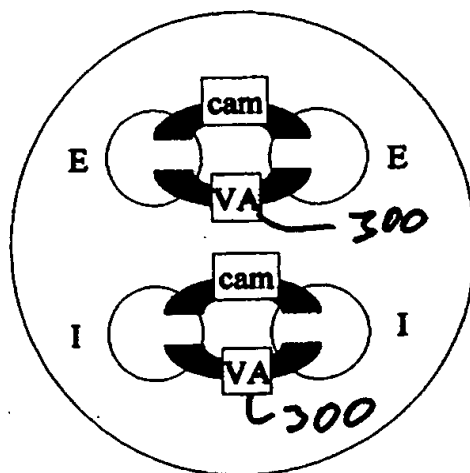


Fig. 20